WPS5343

Policy Research Working Paper 5343

Characterizing the Business Cycles of Emerging Economies

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The World Bank
Latin America and the Caribbean Region
Office of the Chief Economist
June 2010

Policy Research Working Paper 5343

Abstract

Using the dating algorithm by Harding and Pagan (2002) on a quarterly database for 23 emerging market economies (EMEs) and 12 developed countries over the period 1980.Q1–2006.Q2, the authors proceed to characterize and compare the business cycle features of these two groups. They first find that recessions are deeper and more frequent among EMEs (especially, among LAC countries) and that expansions are more sizable and longer (especially, among East Asian countries). After this characterization, this paper explores the linkages between the cost of recessions (as measured by the average annual rate of output loss in the peak-to-trough phase of the cycle) and several country-specific factors. The main findings are: (a) adverse terms of trade shocks raises the cost of recessions in countries with a more open trade regime, deeper financial markets and, surprisingly, a more diversified output structure. (b) U.S. interest rate shocks seem to have a significant impact on the cost of recessions in East Asian countries. (c) Recessions tend to be deeper if they coincide with a sudden stop, but the effect tends to be mitigated in countries with deeper domestic credit markets. (d) Countries with stronger institutions tend to have less costly recessions.

This paper—a product of the Office of the Chief Economist, Latin America and the Caribbean Region—is part of a larger effort in the department to characterize economic fluctuations in the region and across the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at ccalderon@worldbank.org.

Characterizing the Business Cycles of Emerging Economies*

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JEL Codes: E32, F41

Key Words: Business cycles, peaks and troughs, emerging markets

Word count: 11,800

* We would like to thank Gianluca Clementi, Klaus Schmidt-Hebbel and Rodrigo Valdés for comments as suggestions as well as participants at the WB-CEPR-CREI Conference on "The Growth and Welfare Effects of Macroeconomic Volatility," 2007 LACEA Conference in Bogotá, 2007 Meetings of the Chilean Economic Society (SECHI) and the Central Bank of Chile Seminar. We specially thank David Rappoport for outstanding research assistance. The views expressed in this paper are those of the authors, and do not necessarily reflect those of the World Bank or its Boards of Directors. The usual disclaimer applies.

1. Introduction

Emerging market economies (EMEs) have been largely characterized by their macroeconomic volatility. Fluctuations in output, exchange rate and current account balances are typically more frequent, sharper and sudden than among industrial economies. Historically, the culprit of the greater volatility in EMEs' business cycles has been posited on country specific factors such as the excessive dependence on a few (and volatile) sectors, a narrow tax base, weak institutions and poor economic policies. More recently, the focus has been gradually shifted towards the external (exogenous) environment faced by EMEs —say, real shocks (e.g. shocks to commodity prices and to the country's external demand), financial shocks (sudden stops due to changes in global liquidity conditions) and natural disasters (Calderon and Levy-Yeyati, 2009).

During the 1990s, emerging market economies have experienced large and persistent fluctuations. On average, emerging market economies have been more prone to sharp deteriorations in terms of trade, fluctuations in country spreads and sovereign credit ratings, and sudden reversals in the capital account (The World Bank, 2007). Crises episodes in the 1990s (*e.g.* the Tequila and East Asian Crisis, depreciation of the Brazilian and Russian currencies) have increased the interest in disentangling the sources of economic crisis episodes. Despite the large output fluctuations in EMEs, the study of business cycles has been mainly conducted for developed economies. Some exceptions are Hoffmaister et al. (1998), Agénor, McDermott and Prasad (2000), Herrera, Perry and Quintero (2000), Aguiar and Gopinath (2004), Neumeyer and Perri (2005), Raddatz (2005), Aiolfi, Catao and Timmermann (2005) and Cerra and Saxena (2005). They provide answers to different questions that characterized differences in business cycles between EMEs and developed economies. One of the limitations is that most of these papers either use annual data or they limit to a small group of countries.

A group of researchers have recently tried to explain the excess volatility of output fluctuations in emerging markets relative to industrial economies. Aguiar and Gopinath (2007) argue that a DSGE model with shocks to trend growth can match the stylized facts of business cycles in EMEs. Neumeyer and Perri (2005) and Uribe and Yue (2006), on the other hand, show that a DSGE model with interest rate shocks and a financial imperfection will replicate the moments found in the data for EMEs. However, these models fall short of providing a deeper understanding of the mechanism through which: (a) the shock to trend growth occurs, and (b) changes in fundamentals may affect country risk.

A full explanation of the causes of business cycles in EMEs goes beyond the scope of the present paper. Our goal is rather modest. We attempt to characterize the business cycles in terms of the duration, amplitude and cost for EMEs compared with industrialized nations, using quarterly data. Following this characterization, we look for a potential explanation for the cost of recessions. More specifically, we explore the association between the cost of recessions and indicators of macroeconomic stability and external imbalances, external shocks and some structural policies and features such as the degree of international integration in trade and finance, and the quality of institutions and the regulatory framework of the countries including in our sample.

We are interested in documenting the differences in the business cycle facts for Latin American countries, East Asian fast-growing economies and other emerging market economies as well as OECD countries. More specifically, we assess whether these differences are attributed to economic fundamentals or any unknown factor. Also, are differences over time in (the duration, amplitude and cost of) recessions or the fundamentals have changed? What is the relationship between the depth of recessions and economic rigidities? Are recessions more sizable and adjust to slow when labor markets or output markets are more rigid?

The paper is divided in 5 sections. In Section 2 we briefly describe the methodology used by Harding and Pagan to characterize the business cycle. Following the traditional approach outlined by Burns and Mitchell (1946), we identify turning points in an aggregate series —specifically, output levels. Once identified the turning points, several characteristics of the cycle are defined —e.g. duration of the phases, output loss or gained in each phase, among others. Then, we discuss the results of applying this methodology to twelve Latin American (LAC), eight East Asian and Pacific (EAP) and three other emerging economies. The advantage of using this methodology is two-fold: (a) the identification of cycles neither relies nor depends on any trend-cycle decomposition technique, and (b) it develops an algorithm that provides a statistical foundation to the process of identification of turning points developed by Burns and Mitchell (1946). For comparative purposes the same methodology is applied to 12 developed economies.[1] In section 3 we review the literature that could explain difference in the cycles between developed and emerging economies. In section 4 we analyze the average output loss during recessions and the output gains over expansion phases. External factors, openness and capital market development seems to explain the cost of recessions. We also explore the correlation of recessions' characteristics and different plausible explanation for the cost of this phase. We present correlation between number of contractions and intensity of the recessions with regulatory variables such as access to credit, labor market rigidities, and quality of institutions. Finally, section 5 concludes.

2. Characterization of business cycles

In the present section we briefly present the methodology used to characterize the business cycle for a sample of selected emerging market economies. There is not a unique approach to measure the features and intensity of business cycle in the literature. However, we follow a more traditional approach in this paper. Specifically, we use the algorithm designed by Harding and Pagan (2002) to identify turning points in the (log)

[1] The full sample of countries is presented in Appendix I.

level of GDP. Once we compute these turning points, we proceed to calculate different business cycle features and output cost measures across emerging economies, and compare them with analogous figures for selected industrial economies.

2.1 Methodological issues

Typically, research on business cycles has focused on time series *adjusted for long-run trends*, with the latter being obtained by using some specific de-trending technique —say, a deterministic trend model, the Hodrick-Prescott filter, and the band-pass filter, among others. In contrast, influential early studies such as Burns and Mitchell (1946) defined business cycles as sequences of expansions and contractions in the *levels* of either total output or employment (which were evaluated without any type of preliminary de-trending). This is the position advocated by the (so-called) *classical cycle* approach (dominant in NBER studies of business cycles).[2]

The *classical approach* consists of finding the turning points in an aggregate series —typically, the (log) level of real GDP— in order to identify peaks and troughs. Following this principle, Harding and Pagan (2002) argue that this traditional cycle measure has the advantage that the results are independent of the trend-cycle decomposition technique chosen by the researcher. These authors extend the Bry and Boschan (1971) algorithm to identify cyclical turning points in quarterly series –i.e. the *BBQ* algorithm.[3] In fact, the *BBQ* algorithm requires that:

[2] The NBER dating methodology shows evidence that the world economy has suffered major slowdowns in economic activity (that is, declines in growth rates that remain positive). In fact, they argue that the post-1973 slowdown in the world economy has had more adverse consequences than a mild and short recession. The analysis of these so -called *growth cycles* requires the computation of the level of economic activity as fluctuations in real GDP around their trends. In this case, the estimation of trend outputs —although not necessarily needed for business cycle analysis— is key to undertake growth cycle analysis (Zarnowitz and Ozyildirim, 2001).

[3] Harding and Pagan (2002) also show that their algorithm is preferable to date turning points than competing ones, such as the Markov Switching (MS) model (Hamilton, 1989). They argue that BBQ is superior to the MS due to the fact that the latter depends on the validity of the underlying statistical framework.

(1) Complete cycles should run from peak to peak and have two phases, contraction (peak to trough) and expansion (trough to peak), and peaks and troughs must alternate, and

(2) The minimum duration of a complete cycle is of at least five (5) quarters and that each phase of the cycle must last at least 2 quarters.

Local maximum and minimum values of real output (typically expressed in natural logs) can be determined by looking at the differences of our measure of real GDP. We denote y_{it} as the (log level of) quarterly real GDP of country i in time t. Hence, Harding and Pagan define the local optima as follows:

(a) A cyclical **peak** in the level of real output of country *i* occurs at time *t* if:

$$\left(1-L^2\right)y_{it} > 0, \left(1-L\right)y_{it} > 0 \text{ and } \left(1-L\right)y_{i,t+1} < 0, \left(1-L^2\right)y_{i,t+2} < 0$$

(b) A cyclical **trough** takes place in country *i* at time *t* if:

$$\left(1-L^2\right)y_{it} < 0, \left(1-L\right)y_{it} < 0 \text{ and } \left(1-L\right)y_{i,t+1} > 0, \left(1-L^2\right)y_{i,t+2} > 0$$

and *L* is the lag operator, where $L^k x_t = x_{t-k}$. The algorithm described above ensures that y_{it} is a local optimum relative to 2 quarters on either side of y_{it}.[4] This notion of local optimum, in addition to the compliance of the censoring rule (minimum duration of cycle and phases), defines a complete cycle.[5]

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[4] An even simpler *sequence* rule is available from the idea that a turning point in a graph at time t requires that the derivative change sign at t. Thus, treating Δy_t as a measure of the derivative of y_t with respect to t, leads to the use of the sequence $\{\Delta y_t>0, \Delta y_{t+1}<0\}$ as signaling a peak. The problem with the latter is that it would conflict with the requirement that a phase must be at least 2 quarters in length.

[5] Alternatively, Canova (1994) designs a methodology to date turning points based on the *cyclical component* of GDP, y_t^C. This cyclical component could be obtained using a different array of filters (say, Hodrick-Prescott filter, band-pass filter, among others). He focuses on the following dating rules: First, a *trough* occurs when two consecutive declines in the cyclical component of GDP are followed by an increase —that is, $y_{t+1}^C > y_t^C < y_{t-1}^C < y_{t-2}^C$. Second, a peak takes place when two consecutive increases in the cyclical component of GDP are followed by a decline —that is, $y_{t+1}^C < y_t^C > y_{t-1}^C > y_{t-2}^C$.[5] Finally, the rule selects *quarter t* as a trough when at least two consecutive negative spells in the cyclical component of GDP over a three quarter period. That is, a trough occurs when $y_t^C < 0$ and $y_{t-1}^C < 0$ and/or when $y_{t+1}^C < 0$ and $y_t^C < 0$. Analogously, a peak is detected when there are at least two consecutive positive spells over a three quarter period: when $y_t^C > 0$ and $y_{t-1}^C > 0$ and/or when $y_{t+1}^C > 0$ and $y_t^C > 0$.

Using the methodology described above, we identify peaks and troughs in the quarterly series of real GDP for **35** countries over the period 1980-2006. After computing the turning points in real output, we characterize the business cycle of emerging market economies vis-à-vis developed countries by calculating the main features of their output fluctuations:

(1) *Duration of the cycle.* It is computed as the number of quarters from peak to trough during contraction episodes and from trough to the next peak in the expansion phase. This tends to overestimate the length of recovery, and it will show strong asymmetry. In addition, we also compute the number of periods that it takes the level of output to reach its initial level.

(2) The *amplitude of the cycle* is calculated as the maximum drop of GDP from peak (trough) to trough (peak) during episodes of contraction (expansion). For instance, the amplitude of the contraction, A_C, measures the change in the real GDP from a peak (y_0) to the next trough (y_K), that is, $A_C = y_K - y_0$.

(3) We estimate *cumulative variation of the cycle* as the area of the triangle conformed by the duration and amplitude. It reflects the idea of foregone output from peak to troughs during contractions and the output gains during expansion episodes. For the peak-to-trough phase of the cycle, the *cumulative output loss* L_C *(i.e.* an approximate measure of the overall cost of a cyclical contraction), with duration of *k* quarters, is defined as:

$$L_C = \sum_{j=1}^{k} (y_j - y_0) - \frac{A_c}{2}$$

In the following sub-section we will proceed to compute these business cycle features for our sample of emerging markets as well as industrial countries (see list of countries in Appendix I).

2.2 Characterizing classical cycles

In the present section, we have estimated the duration, amplitude and cost of the business cycle for our sample of 23 emerging markets (12 LAC, 8 EAP economies and 3 Other emerging economies) as well as for 12 industrial economies over the period 1980-2006 according to the methodology presented above.[6]

It has usually been argued that output fluctuations in emerging markets vis-à-vis developed economies are more volatile and more prone to sharp deterioration in terms of trade, sudden stops in capital inflows, and drastic swings in economic policies. In what follows, we report the main statistics on duration and amplitude of the cycle phases (expansions and contractions) among emerging markets (Latin America, East Asia and other emerging markets) and among OECD economies.

2.2.1 Duration of the cycle

Fact 1: The duration of contractions is almost similar across country groups, with very low dispersion within each country group.

We find that contractions among the 12 LAC countries in our sample last approximately **3.5** quarters (10-11 months) with a standard deviation of nearly 1 quarter. These average duration of the peak to trough phase in Latin America is slightly similar to that of East Asian Countries (with a mean duration of **4.2** quarters for our sample of 8 countries — mainly driven by the duration in Thailand) and that of OECD economies (i.e. an average duration of **3.6** quarters for a sample of **12** countries).

We should note that Uruguay has the longest average contractions in the region (5.5 quarters), followed by Venezuela and Argentina (4.6 and 4.5 quarters, respectively). On the other hand, Costa Rica and Brazil exhibit the shortest contractionary phases in the region (2.5 and 2.8 quarters, respectively). On the other hand, contractionary episodes

[6] The "other" emerging market economies are India, South Africa, and Turkey.

among East Asian countries have a larger degree of variability than those in LAC (1.7 vis-à-vis 0.8 quarters), with Thailand displaying the longest contraction duration (8 quarters) while contractions in Taiwan, South Korea, and Hong Kong last only 3 quarters.[7]

Finally, we should point out that we calculated some features of the business cycle of other emerging markets (not located in Latin America or East Asia) where we have quarterly data on GDP. More specifically, we computed the duration and amplitude of output fluctuations in India, South Africa and Turkey. We find that output contractions in South Africa last the longest in our sample of 23 emerging market economies (with an average duration of 8.3 quarters).

Fact 2: The duration of expansions differ substantially in mean and dispersion across country groups.

Table 1 shows that, on average, expansion episodes among LAC countries are shorter in duration (**16** quarters) than those of East Asian countries (**21.3** quarters) and OECD economies (approximately **24** quarters). Phases of expansion in economic activity among LAC countries also display a higher degree of variability (*i.e.* a standard deviation of **17.6** quarters) than those of East Asian countries and OECD economies (**13.6** and **11** quarters, respectively).

We also find that within the LAC region there is a widespread variation across countries. The average duration of expansionary phases (in quarters) fluctuate between 5.3 (Paraguay) and 62 (Colombia). One the other hand, the range of variation of expansionary phase duration goes from 5 (Taiwan) to 44 quarters (Malaysia). Finally, we should point out that expansions are shorter for the average EE group, but with a big dispersion compared to the OECD economies.

[7] We also collected a measure of GDP, quarterly data, for China; however we could not register an output contraction within the sample period of our data.

Fact 3: Recessions in LAC countries are on average as long as those in East Asian countries and industrial economies. However, they are likely to take place more frequently.

In Table 1 we report that the number of contractions among emerging markets is larger than that of OECD economies (**4.5** vs. **3.3** episodes). We should also point out that, during our sample period, Latin American (**LAC**) countries exhibit on average the highest number of contractions (almost **5** contractionary phases per country). East Asian countries and industrial economies, on the other hand, have had **2.9** and **3.3** phases of contraction. Finally, there is higher dispersion in the number of contractions among LAC countries (2.8) than among EAP and OECD economies (1.7 and 1.5, respectively).

2.2.2 Amplitude of the Cycle

Fact 4: There are large differences in the mean amplitude of the cycle between industrial economies and emerging markets. The latter group also shows a higher degree of dispersion.

Phases of contraction in economic activity among LAC countries and East Asian countries are deeper relative to OECD economies (**2.2** percent). The mean amplitude from peak to trough (P-T cycle) for our sample of 12 LAC economies is **6.2** percent —that is, lower than the amplitude of contractions in our sample of 8 East Asian countries (**7.4** percent).

Table 1: Characterizing classical cycles (*Quarterly data 1980-2006Q2*)

	Mean duration (quarters)		*Mean amplitude (%)*		*Cumulation (%)*		*Number of Contractions*
	Contractions	Expansions	Contractions	Expansions	Contractions	Expansions	
LAC (12)							
ARGENTINA	4.5	7.1	-9.4	12.1	-22.7	61.3	8.0
BOLIVIA	3.0	.	-2.0	.	-1.9	.	1.0
BRASIL	2.8	6.9	-4.3	9.6	-6.0	51.4	10.0
CHILE	3.3	30.0	-10.1	55.6	-25.5	855.5	3.0
COLOMBIA	3.0	62.0	-4.1	59.9	-9.1	1900.3	2.0
COSTA RICA	2.5	9.0	-0.6	13.1	-0.9	56.8	2.0
ECUADOR	3.2	10.0	-5.2	11.6	-7.3	71.3	6.0
MEXICO	3.7	12.6	-4.4	13.9	-8.1	145.3	6.0
PARAGUAY	3.5	5.3	-6.1	7.2	-11.6	17.7	4.0
PERU	3.7	8.2	-12.6	18.0	-20.9	112.0	7.0
URUGUAY	5.5	8.5	-9.8	12.4	-27.0	86.9	4.0
VENEZUELA	4.6	6.3	-9.0	8.5	-19.0	44.6	8.0
LAC (12) Average	**3.5**	**16.0**	**-6.2**	**21.3**	**-12.8**	**335.8**	**4.8**
LAC (12) Std. Dev.	**0.8**	**17.6**	**3.8**	**19.4**	**9.5**	**602.9**	**2.8**
Asia (8)							
HONG KONG	3.0	13.6	-4.2	24.7	-7.3	233.1	6.0
INDONESIA	3.3	29.0	-7.5	62.6	-19.3	1018.8	3.0
KOREA	3.0	.	-9.3	.	-13.6	.	1.0
MALAYSIA	4.5	44.0	-8.0	91.3	-17.7	1882.3	2.0
PHILLIPINES	5.0	17.0	-6.3	20.3	-24.7	184.7	4.0
SINGAPORE	3.8	19.3	-4.6	43.1	-7.9	837.8	4.0
TAIWAN	3.0	5.0	-3.2	7.7	-5.4	22.4	2.0
THAILAND	8.0	.	-16.1	.	-45.7	.	1.0
Asia (8) Average	**4.2**	**21.3**	**-7.4**	**41.6**	**-17.7**	**696.5**	**2.9**
Asia (8) Std. Dev.	**1.7**	**13.6**	**4.1**	**31.0**	**13.1**	**701.6**	**1.7**
Other Emerging Economies							
INDIA	3.0	30.0	-2.0	57.1	-4.5	973.0	2.0
SOUTH AFRICA	8.3	9.5	-4.6	8.7	-16.1	40.5	3.0
TURKEY	3.0	11.8	-7.8	20.9	-10.3	150.5	5.0
OEE Average	**4.8**	**17.1**	**-4.8**	**28.9**	**-10.3**	**388.0**	**3.3**
OEE Std. Dev.	**3.1**	**11.2**	**2.9**	**25.2**	**5.8**	**509.6**	**1.5**
EE Average (23)	**4.0**	**17.3**	**-6.6**	**27.9**	**-14.5**	**437.3**	**4.1**
EE Std. Dev.	**1.5**	**14.9**	**3.7**	**24.5**	**10.4**	**603.5**	**2.5**
OECD Average (12)	**3.6**	**23.8**	**-2.2**	**20.2**	**-4.6**	**330.3**	**3.3**
OECD Std. Dev.	**1.2**	**10.0**	**1.1**	**8.7**	**2.8**	**197.8**	**1.5**

[a] *Includes the following countries: Australia, Canada, France, Germany, Italy, Japan, New Zealand, Portugal, Spain, Sweden, United Kingdom, United States.*

These averages are strongly influenced by Peru and Chile in the LAC region and by Thailand in the group of EAP countries. Thus, each group of emerging countries shows a larger extent of variability in mean amplitude relative to industrial economies. The standard deviation for LAC countries is 3.8 percent, with the mean amplitude fluctuating between 0.6 percent (Costa Rica) and 12.6 percent (Peru). Dispersion in the mean amplitude is slightly larger among EAP countries (4.1), where the lowest mean amplitude is 3.2 percent (Hong Kong) and the largest is 16.1 percent (Thailand).

On the other hand, East Asian economies show more dynamic expansions than any other region, with mean amplitude of the trough to peak (T-P) phase of approximately 42 percent (substantially higher than the 21 percent in LAC, 29 percent in other emerging economies and 20 percent among industrial countries). These numbers could be downward bias since for the EAP countries we do not have data for Korea and Thailand since they show only one recession in the data; and they are experiencing an expansionary phase that was still ongoing up to the end of our sample period (2006.Q2). In addition, recovery phases among industrial economies are less volatile. For instance, the mean amplitude of trough-to-peak phases among emerging markets fluctuates from 7.2 percent (Paraguay) to 91.3 percent (Philipines), with a standard deviation of 25 percent compared to the 8.7 percent among OECD countries.

2.2.3 Accumulation of the Cycle[8]

Fact 5: Output losses during peak-to-trough phases are larger among emerging market countries than among industrial ones.

The cumulative output loss among LAC countries over the period is, on average, **12.8** percent, although it shows considerable variability within the countries in the region.[9]

[8] The column labeled cumulative variation presents the output loss (gain) from peak to trough (trough to peak) of the output cycle.

Uruguay and Chile display the largest output losses (**27** and **25.5** percent, respectively) while Costa Rica shows the smallest output loss (around **1** percent). In addition, output loss is also substantial on average among EAP countries (17.1 percent), with a higher degree of dispersion than among LAC economies. The cumulative output drop during the peak-to-trough phase fluctuates between **5.4** percent (Taiwan) and **45.7** percent (Thailand). The small group of other emerging economies shows less severe losses than the other two groups. However, OECD economies, as expected, show the lowest level of output losses (**4.6** percent) and the lowest level of dispersion (**2.8** percent).

Fact 6: Output gains during trough-to-peak phases are larger among emerging market economies.

We find that although output losses are smaller among OECD countries, expansions are stronger among emerging market economies. This result may be attributed to the forces of conditional convergence, where growth in the transition to steady state is higher for developing economies (that is, countries with lower income per capita). For instance, Colombia and Malaysia achieved the largest output accumulation during the expansion phases.[10] On the other hand Argentina and Chile show large output losses; however, they are quite different in terms of expansions. While Chile shows one of the largest expansions in terms of cumulative output, Argentina is below average in this dimension.

If we focus only on the contraction phases, it may be interesting to look at its behavior under a different metric. Rather than measuring the duration of a recession from peak to trough, we calculate the duration of the recession from its peak to the moment when the GDP reaches the initial level (which corresponds to that peak). The cost of the recession is the integral of the foregone output between these two points (see Table 2).

[9] In the appendix we include a different measure of cost of a recession. We estimate the foregone output from peak up to the GDP reaches its initial level —that is the last peak level (see Table II.1).
[10] Korea, Taiwan and Thailand do not have data for trough-to-peak since they have experienced only one recession in the entire period. Therefore, the algorithm does not identify another peak.

Table 2. Characterizing recessions

	Number of Contractions	Mean Duration of the Recesssion	Foregone Output
LAC (12)			
ARGENTINA	8.0	14.0	-98.7
BOLIVIA	1.0	5.0	-3.1
BRASIL	10.0	7.8	-21.6
CHILE	3.0	10.3	-91.3
COLOMBIA	2.0	10.5	-28.6
COSTA RICA	2.0	3.5	-0.9
ECUADOR	6.0	6.2	-15.9
MEXICO	6.0	10.8	-26.4
PARAGUAY	4.0	13.3	-49.8
PERU	7.0	14.6	-146.5
URUGUAY	4.0	13.8	-111.2
VENEZUELA	8.0	11.6	-63.5
LAC (12) Average	4.8	10.0	-54.0
LAC (12) Std. Dev.	2.8	3.9	49.6
EAP (8)			
HONG KONG	6.0	5.0	-11.8
INDONESIA	3.0	6.0	-41.6
KOREA	1.0	8.0	-36.7
MALAYSIA	2.0	10.5	-39.5
PHILLIPINES	4.0	10.5	-59.3
SINGAPORE	4.0	6.0	-13.8
TAIWAN	2.0	5.0	-7.9
THAILAND	1.0	22.0	-134.4
EAP (8) Average	2.9	9.1	-43.1
EAP(8) Std. Dev.	1.7	5.7	40.9
Other Emerging Economies			
INDIA	2.0	4.5	-5.5
SOUTH AFRICA	3.0	14.3	-28.6
TURKEY	5.0	7.0	-28.9
OEE Average	3.3	8.6	-21.0
OEE Std. Dev.	1.5	5.1	13.4
OECD Average	3.3	7.0	-9.1
OECD Std. Dev.	1.5	2.7	6.0

[a] Include Australia, Canada, France, Germany, Italy, Japan, New Zealand, Portugal, Spain, Sweden, United Kingdom, United States.

Analogously to the findings presented in Table 1, the results provided in Table 2 shows that:

- Output contractions have been much more costly in Latin America than in Asia and OECD countries. Foregone output in LAC totaled, on average, approximately 54 percent (relative to 43 percent in East Asian countries, 21 percent in other emerging market economies, and 9 percent among industrial economies). Surprisingly, Costa Rica and Bolivia show a substantially low cost of the recession that pushes the average down for LAC. If we do not these two countries in the sample, the rest of LAC exhibit on average output loss of 66 percent.
- Dispersion in foregone output within the LAC region is the highest among the country groups under study (49 percent). Within Latin America, Peru displays the highest cost in foregone output (147 percent) while Costa Rica has the smallest (1 percent).
- Not surprisingly, the cost of recessions in Hong Kong, Singapore and Taiwan is similar to the one experienced by industrial countries.

3 Explaining business cycles in emerging economies: Theory and evidence

One of the main features of business cycles in emerging markets is their higher volatility when compared to those of developed economies. Output growth, exchange rates and current account balances tend to exhibit more frequent, large and, in many cases, sudden variations, with persistently adverse impact on social welfare. The literature distinguishes other aspects that characterize output fluctuations in emerging market economies (vis-à-vis developed countries): (a) consumption is more volatile than output –typically, with a ratio greater than one (and larger than that of developed countries), (b) net exports are strongly counter-cyclical, and (c) real interest rates are highly volatile, counter-cyclical and lead the cycle (Neumeyer and Perri, 2005; Uribe and Yue, 2006; Aguiar and Gopinath, 2007, 2008).

In addition to those reported facts, Section 2 provides evidence that there are substantial differences in the size and duration of business cycles across emerging economies and when compared to developed countries. For instance, although the duration of peak-to-trough phases is almost similar in EMEs vis-à-vis developed countries, the amplitude and output loss in the former group is significantly larger. Hence, the aim of this section is to review some of the recent theoretical and empirical contributions that will motivate our empirical analysis in Section 4. There, we search for explanations of the cross-country (and cross-regional) differences in amplitude of the output fluctuations.

Why are business cycles in emerging markets more volatile than those of developed economies? Are emerging market economies more exposed to shocks (that are highly persistent) or are they more vulnerable to them? If vulnerabilities are important, do they depend on specific structural and financial characteristics of the domestic economy? A recent strand of the literature has attempted to build dynamic general equilibrium models to explain the main business cycle facts of emerging markets as opposed to developed economies. The literature has followed the work of Backus, Kehoe and Kydland (1992), who extended the real business cycle literature to open economies. In the same vein, Mendoza (1991) explains the key elements behind the cycle's regularities in small developed economy like Canada.

One of the main features that distinguish cyclical fluctuations in emerging markets (vis-à-vis developed counties) is their higher volatility –partly manifested in the occurrence of more frequent and deeper recessions. The approach undertaken to model the differences between developed and developing economies has followed the transitional RBC approach -i.e. a neoclassical model without distortions and purely driven by productivity shocks (see Mendoza, 1991, 1995; Correia et al. 1995; Kydland and Zarazaga, 2002). These initial efforts used a general equilibrium model to show how external shocks (say, terms of trade shocks) could explain the observed features of business cycles in emerging economies and developing economies which are open to financial flows. However, their

simulations were at odds with the stylized facts of their business cycles: consumption was less volatile than output, net exports were mildly countercyclical, and interest were either a-cyclical or pro-cyclical and played a minor role in driving cycles.

In a seminal paper, Aguiar and Gopinath (2007) introduces a shock to trend growth (in addition to transitory shocks) to a standard RBC model to explain qualitatively and quantitatively the business cycle features of emerging markets. They assume that **shocks to trend growth** are the primary source of fluctuations in emerging market economies as opposed to transitory shocks in the case of developed economies (which usually show a more relatively stable trend). The rationale behind this assumption is that emerging market economies, unlike developed ones, are characterized by frequent changes in economic policy. In sum, this assumption implies that the random walk component of the Solow residual is relatively larger in emerging markets.

Aguiar and Gopinath (2007) interpret the shocks to trend output in emerging markets as those often associated with sharp changes (or reversals) in government policy –specially, in the monetary and fiscal front, as well as trade policy. Using the permanent income hypothesis as an identification mechanism, they find that a shock to growth in EMEs is more likely to boost both current and future output (trend shock) and, hence, consumption would respond more than proportionally to income, savings will decline, and the trade deficit will widen. Finally, we need to point out that Aguiar and Gopinath argue that the differences in the Solow residual processes between emerging markets and developed countries may be the outcome of deeper frictions in the economy. In fact, Chari, Kehoe and McGrattan (2007) show that many frictions (including financial frictions) can be represented in reduced form as Solow residuals and, they appear as exogenous productivity shocks from the private agent's perspective. Finally, a caveat of this approach is that the authors do not model what is behind these shocks; they just outline some hypotheses such as economic reforms, credit constraints, and other market frictions.

Another approach to explain the observed difference between the cycles emerging markets and developed economies is the interaction between foreign interest rate shocks and domestic financial frictions. In this context, Neumeyer and Perri (2005) developed a model where shocks to country interest rates play a major role in driving business cycles in EMEs. They introduce two modifications to the standard dynamic general equilibrium model for a small open economy. First, they create a demand for working capital –where firms have to (partially) pay for the inputs before production takes place. Second, they consider a system of preferences where the labor supply is not associated to consumption. According to their model, firms will demand working capital to finance the wage bill –thus, rendering the demand for labor sensitive to interest rate fluctuations. Hence, an increase in the country's interest rates raises their effective labor costs and reduces their demand for labor (at any give real wage). Since the labor supply is insensitive to interest rate shocks, the lower demand induces a lower equilibrium employment and, hence, an output drop.

Neumeyer and Perri (2005) also point out that the interest rate faced by EMEs is the sum of two independent components: (a) the international trade, and (b) the country risk spread. Regarding the latter, they assume that changes in country risk spreads can be induced by fundamental shocks to the domestic economy (say, productivity shocks), and that these shocks drive both business cycles and fluctuations in country risk. Finally, the authors find that the model matches the data for emerging markets (e.g. Argentina) when assuming that: (a) changes in domestic fundamentals may affect the country spread, and (b) the resulting changes in interest rates may affect output through the demand for working capital –thus amplifying the effect of fundamental shocks on business cycles.

Uribe and Yue (2006) also document the counter-cyclical nature of the cost of borrowing of EMEs in international financial markets and examine the role of movements in country interest rates in driving business cycles. They goes further than Neumeyer and Perri (2005) by evaluating whether country interest rates drive output fluctuations in EME, or the

other way around, or both. In short, their paper aims at disentangling the nature of the inter-relationship between country spreads, the world interest rates and business cycles in EMEs. They build a model with four distinctive aspects: (a) demand for working capital that requires firms to hold non-interest bearing liquid assets in an amount proportional to their wage bill, (b) gestation lags in the production of capital, (c) external habit formation, and (d) an information structure where output and absorption decisions in each period are made before that period's international financial conditions are revealed. Simulations of the Uribe-Yue model show that country spreads do drive business cycles in EMEs and the other way around. However, these effects are not large. Approximately 12% of fluctuations in economic activity are explained by country spread shocks and, in turn, 12% of shifts in country spreads are determined by shocks to macroeconomic fundamentals in EMEs.

Boz, Daude and Durdu (2008) attributed the differences in output fluctuations between emerging markets and developed economies on **imperfect information and learning** about trend shocks hitting the economy. They developed a small open economy where agents in EMEs observe all past and current realizations of TFP shocks but do not observe the realization of their trend growth and transitory components; however, agents can form expectations about these components. On the other hand, agents in developed economies are fully informed about the decomposition of TFP.[11]

The imperfect information model of Boz, Daude and Durdu (2008) can generate moments that match the data for 25 emerging market economies and 21 developed countries, and the mechanism that drives the results relies on the learning dynamics of agents. Agents form their expectations and revise them with a bias towards more emphasis in trend shocks when given a signal. This learning mechanism dampens the effect of cyclical shocks relative to trend, and assigning a relatively higher probability to the latter component

[11] This assumption implies that agents in the emerging market economy are myopic –i.e. they may react to transitory shocks as if they were permanent, thus amplifying fluctuations.

(trend growth) would lead to stronger effects on policy decisions and, hence, yield "*permanent*" responses.

In a recent paper Chang and Fernández (2009) compares the two strands of the literature that aim to explain emerging market fluctuations: (a) shocks to trend growth, and (b) foreign interest rates coupled with financial frictions. More specifically, the authors build a DSGE model that encompasses these two strands by incorporating stochastic trends, interest rate shocks and financial frictions. Using Bayesian techniques, the authors assess the relative performance of the alternative models by comparing their ability to match selected moments of the data for Mexico. The model with foreign interest rate shocks along with financial imperfection is better at explaining emerging market fluctuations that the model with shocks to trend growth. In addition, the evidence from model simulations also show that between the two financial frictions considered, the spread linked to fundamentals (rather than the demand for working capital) provides a better approximation to the data.

Finally, Comin et al. (2009) compares the responsiveness of emerging markets and developed economies to shocks by building a two-country asymmetric DSGE model (*e.g.* US and Mexico). This model includes a product cycle structure that determines the range of intermediate goods used to produce new capital in each country, and investment flow adjustment costs in developing countries (*e.g.* Mexico). R&D spending in developed economies (*e.g.* US) creates new intermediate goods, and the country needs to incur in sunk costs to raise the variety of intermediate goods exported to Mexico –i.e. *extensive margin of trade* (Stokey, 1991). Furthermore, FDI can facilitate the transfer of intermediate goods production to Mexico from where it is exported to the U.S. If the extensive margin of trade and FDI are endogenous, U.S. shocks will affect the follow of new technologies in Mexico by changing the value of exporting and transferring technologies. And, given that technology diffusion takes time, it will create a great gap in

the availability of production technologies between Mexico and the U.S. Hence, U.S. shocks will have larger and more persistent effects in Mexico than in the U.S. itself.

The empirical literature is very extensive for developed economies, for instance Crucini, Kose and Otrok (2008), Centoni, Cubadda and Hecq (2007) and the references therein. The main explanations for business cycles in this literature are productivity shocks. For samples that involve both emerging and developed economies Kose, Otrok and Whiteman (2003), analyze the importance of domestic and external factors as causes of cycles. They found that less developed economies are more likely to experience country specific business cycles. From a longer time perspective, Alfioli, Catao and Timmerman (2008) construct a long index of business cycle for Argentina, Brazil Chile and Mexico. They show how external variables has driven the cycles during inward and outward oriented periods lived by these countries. In terms of deepness of recessions and recoveries Cerra and Saxena (2008) documents in a large sample of countries that cycles associated with financial and political crisis generate large output losses. These events may drive the results presented in the previous section, since many emerging economies experienced these problems more often. Closely related to this fact is the idea of sudden stops as important factor of large cycles in emerging market that together with other financial frictions amplified the cycles (Calvo, 1998, Mendoza, 2006).

The advantage of the results presented here is that the output loss in recession has been estimated using quarterly data, as opposed to annual data used in the literature. This measure is more accurate and it allows for further exploration of the causes of the size of recessions.

4 On the causes of the size of recessions in emerging economies

Section 2 and 3 illustrates the main differences in the business cycle features of emerging market economies vis-à-vis industrialized nations. So far the literature has attempted to

explain these differences by either introducing a stochastic productivity trend (Aguiar and Gopinath, 2007, 2008) or foreign interest rate shocks along with financial frictions (Neumeyer and Perri, 2005; Uribe and Yue, 2006). However, the theoretical literature still needs to understand: (a) the forces behind the differences in the TFP of emerging market and OECD economies. Are these differences mainly the reflection of policy reversals or frictions? (b) The mechanisms through which shocks to fundamentals may induce fluctuations in country risk spreads.[12]

This section will focus on a more limited issue. We will try to shed light on the factors that determine the depth of recessions (or peak-to-trough phases of the cycle). Our strategy is two-fold: first, we estimate a cross-section regression where each observation represents an episode of contraction (as defined in section 2). The dependent variable is the average output losses, which is a measure of the cost of recessions. Based on the literature previously discussed we include as determinants of the cost of recession proxies for external shocks (foreign interest rate), macroeconomic instability (inflation, flexibility of exchange rate regimes), and other structural characteristics (trade openness, domestic financial development, quality of institutions), among others. Second, we explore the association between the average cost of recessions over the entire period of analysis and measures of the quality of labor and business regulations over a cross section of countries. The proxies for regulations are not used in the regression analysis since they are available only in the 1990s and do not show enough variability over time.

4.1 Determinants of the size of the recessions

After implementing the Harding and Pagan methodology to identify peaks and troughs in quarterly data for real GDP in **35** economies over the period **1980-2006**, we are able to detect 126 episodes of recession (see Section 2). For each episode we calculated the cumulative change in output (from peak-to-trough) and the duration in quarters, and we

[12] In other words, it could be a supply shock that deteriorate the economic situation of the country, raising risk premium.

define the cost of a recession as ratio of the cumulative output loss during the recession to its duration. Hence, our dependent variable is the cost of the recession and we try to explain the cross-country differences using external shocks, quality of institutions and macroeconomic and structural policies.

Table 3 reports the regression estimates that links the cost of recessions with: (a) regional effects –as proxied by a group of dummy variables that represent different regions such as LAC (Latin-American and the Caribbean), EAP (East Asia) and IND (Industrialized countries). (b) Time-effects (in this case, dummies that capture the decades of the 1980s and 1990s) so as to capture whether recessions were deeper and more costly in specific decades, (c) Turbulent events. Here we control for the occurrence of sudden stops and banking crisis in our regression analysis.

The evidence reported in Table 3 shows, as expected, that recessions in the LAC region are on average more costly than those in EAP and IND. However, the lower cost of recessions is statistically significant and economically important among industrial countries. The average cost of the recession is 1 percent larger in the event of a sudden stop, and approximately 0.5 percent higher if a banking crisis occurs.

Finally, the cost of recessions appears to be not statistically different across decades, except for the LAC region during the "*Lost Decade*" of the 1980s. Our results show that the cost of recessions was higher by **5** percent during the 1980s in the region.

It has usually been argued in the literature that business cycles in emerging markets are more volatile due to the country's vulnerability to large fluctuations in terms of trade, foreign interest rates, and sharp and sudden changes in capital inflows. Some of these shocks –mostly, exogenous and external to the domestic economy– may be amplified by particular characteristics of the economy such as the extent of openness to international markets of goods and assets, the depth of domestic financial markets, or the degree of

specialization of the economy. Inadequate macroeconomic framework and poor quality of institutions can also act as magnifiers of the effects of these exogenous external shocks.

Table 3: Cost of recessions over time and across regions

Dependent variable: *Average output loss*	[1]		[2]		[3]	
Constant	0.014	**	0.009	**	0.013	**
	(0.004)		(0.003)		(0.002)	
Dummy LAC	0.001					
	(0.004)					
Dummy EAP	-0.003					
	(0.005)					
Dummy IND	-0.010	**			-0.009	**
	(0.004)				(0.003)	
Sudden Stops	0.010	**	0.012	**	0.010	**
	(0.003)		(0.003)		(0.003)	
Banking Crisis	0.004		0.005	*	0.003	
	(0.003)		(0.003)		(0.003)	
Dummy 80s			0.004			
			(0.003)			
Dummy 90s			-0.001			
			(0.003)			
Dummy LAC*Dummy 80s					0.005	*
					(0.003)	
Number of episodes	126		126		126	
Adjusted R squared	0.224		0.140		0.242	
White test	0.143		0.759		0.317	

*Standard deviation in parenthesis. *, ** the coefficient is significant at 10% and 5% level, respectively.*

Appendix I reports the definition and sources of the variables involved in our regression analysis. The external shocks are measured using gross FDI Inflows, dummy variable for sudden stops, gross equity related Inflows, terms of trade, G-3 (weighted average of Germany, Japan and US) Real Money Market Rate and US Real Money Market Rate. All these variables are measured as average variation over the last four quarters before the turning point take place. Quality of institutions is measured by the political risk index reported by the International Country Risk Guide (ICRG) at the beginning of the recession. Trade openness, financial openness and financial development at previous year are our measures of structural policies. Real exchange rate undervaluation and average inflation

on the previous four quarters measures the quality of macroeconomic policies. Dummy variable for floating or fixed exchange rate regimes are used to check whether floating exchange rate regimes isolate better the economies[13].

Table 4 present some of the results. We should first note that the dummy for the LAC region in the 1980s and for industrial economies are neither statistically nor economically significant anymore, as opposed to the results reported in Table 3. This implies that our control variables can explain why LAC had large output losses in the 80s and why recessions in industrial countries are less costly, in terms of output loss.

Regarding the external shocks, as expected, terms of trade play an important role in explaining the magnitude of the recession. Our evidence shows that adverse terms of trade of shocks would increase the cost of recessions (in terms of foregone output); but an open trade regime and deeper domestic financial markets will mitigate the effect of the shock. Surprisingly countries with a more diversified economic structure will be more affected by a terms of trade shock. The final effect of the terms of trade shock will depend of the combination of these three variables (trade openness, private credit and concentration of economic activity) at the moment that the recession occurs.

The effect of fluctuations in the U.S. interest rate is not statistically significant, except for *EAP* countries (where the coefficient is positive and significant). Hence, a positive shock in the U.S. interest rate increases the cost of the recession only for this group of countries. We also included the interaction of changes in the US interest rate with private credit and financial openness and they were not statistically significant.

Output losses are still larger when a sudden stop occurs; however, this effect is mitigated in countries with deeper domestic credit market. Financial openness was not statistically significant as explanatory variable or when interacted with financial domestic

[13] Edwards and Levy Yeyati (2005) show evidence in favor of flexible exchange rate as shock absorber.

development. It seems that what really captures the depth of recessions is whether a sudden stop in capital inflows takes place or not. [14]

Variables that measure macroeconomic policy stability and external imbalances have the expected signs. Real exchange rate overvaluation is strongly positive. This implies that recessions are more costly when preceded by a substantial real overvaluation and, typically, real overvaluation precedes currency crisis. Hence, we can argue that expected output losses are larger when currency crisis ensues. On the other hand, inflation has a positive sign although the coefficient is not statistically significant. Finally, we include dummy variables that capture both fixed and floating exchange rate regimes. We find that the cost of the recession (in terms of foregone output) is smaller in countries with more flexible exchange rate arrangements. This result is consistent with the case for flexible rates in Friedman (1958): the output loss in response to adverse real shocks (say, negative terms of trade shocks) is smaller in countries with more flexible exchange rate regimes. Also, note that the interaction with terms of trade was not statistically significant. Finally, we find that, as expected, countries with better quality of institutions typically experience less costly recessions.

[14] Although not reported, these estimations are available from the authors upon request.

Table 4: Explaining the output losses in recessions

Dependent variable: Average output loss	[1]		[2]		[3]		[4]	
Constant	0.026	**	0.028	**	0.029	**	0.027	**
	(0.008)		(0.007)		(0.007)		(0.007)	
External Shocks								
TOT*Open	-0.127	**	-0.120	**	-0.115	**	-0.116	**
	(0.057)		(0.050)		(0.051)		(0.051)	
TOT*private credit	-0.122	**	-0.118	**	-0.112	**	-0.120	**
	(0.053)		(0.051)		(0.053)		(0.053)	
TOT*output Herfindhal	0.571	**	0.552	**	0.555	**	0.591	**
	(0.265)		(0.236)		(0.231)		(0.229)	
Interest US*Dummy IND	-0.008							
	(0.049)							
Interest US*Dummy EAP	0.259	**	0.271	**	0.271	**	0.295	**
	(0.091)		(0.093)		(0.093)		(0.090)	
Interest US*Dummy LAC	-0.005							
	(0.080)							
Sudden Stops	0.015	**	0.016	**	0.016	**	0.016	**
	(0.006)		(0.006)		(0.006)		(0.006)	
Sudden Stops*Private credit	-0.010		-0.010		-0.010		-0.012	*
	(0.007)		(0.007)		(0.007)		(0.007)	
Macroeconomic Stability								
Domestic currency overvaluation	0.027	*	0.028	*	0.029	*	0.032	**
	(0.016)		(0.015)		(0.015)		(0.015)	
log (1+inflation rate)	0.006		0.006		0.006		0.006	*
	(0.004)		(0.004)		(0.004)		(0.004)	
Exchange Rate Regime								
Floating ER	-0.006	**	-0.007	**	-0.007	**	-0.005	**
	(0.002)		(0.002)		(0.002)		(0.002)	
Floating ER*TOT	0.017		0.018					
	(0.024)		(0.023)					
Fix ER	-0.003		-0.003		-0.003			
	(0.003)		(0.003)		(0.003)			
Fix ER*TOT	0.010		0.004					
	(0.054)		(0.053)					
Other variables								
Institutional quality	-0.019	*	-0.023	**	-0.024	**	-0.024	**
	(0.011)		(0.009)		(0.009)		(0.009)	
Dummy IND	-0.002							
	(0.002)							
Dummy LAC*Dummy 80s	0.000							
	(0.004)							
Number of episodes	120		120		120		120	
Adjusted R squared	0.379		0.399		0.409		0.407	

Robust standard errors in parenthesis. *, ** the coefficient is significant at 10% and 5% level, respectively.

4.2 Cycle and microeconomic regulations

The differences in the business cycle features of emerging markets vis-à-vis developed economies not only depends on the size of external shocks hitting the former group (typically, these countries are hit more frequently by volatile external and exogenous shocks) but also are more vulnerable due to some specific structural characteristics of their economy. As argued by Aguiar and Gopinath (2007, 2008), the differences in the TFP shocks between emerging markets and developed economies may reflect frictions in the economy such as financial frictions (e.g. access to credit), frictions in the goods and factor markets (e.g. firing and hiring costs, start-up business) and the quality of the institutions (say, quality of the regulatory framework, corruption, among others). Unfortunately, the data on regulations and/or institutions has very limited variability over time (and most of these series start since the 1990s). We have not included these variables in our regression analysis due to the limited availability of data over time.

In this subsection we will try to characterize the relationship between recession episodes (say, number of contractions and average change in output from peak-to-trough) and microeconomic regulations through scatter plots.

Figures 7 and 8 depict the simple correlation between output loss and the different measure of economic frictions (or rigidities) such as indicators to start and close a business as well as hiring and firing costs. The scatter plots also relate contractions with quality of institutions –we specifically use indicators of contract enforcement (as measured by the number of procedures and time). Finally, the relationship with access to credit, as measured by the cost of getting credit, is also depicted. Note that the definitions and sources of all the regulatory variables are presented in Appendix 1.

What are the main basic lessons from our preliminary observation at the scatter plots? First, countries with more cumbersome (higher number of procedures) and time-consuming (more duration) procedures to either start or close a business usually display a larger number of contractions in their economic activity. This implies that countries with a larger number of contractions are usually associated with economic systems that have a slower process of creation and destruction of firms. In the case of the average loss of recessions, we also find that countries with excessively cumbersome process of creation and destruction of firms usually show the larger average losses due to recession. On the other hand, the higher recovery rate —which measures the efficiency of foreclosure or bankruptcy procedures[15]— the less frequent and less costly the episodes of recessions are.

Second, countries with more rigid labor markets usually display a larger number of contractions, with a larger output loss. However, the degree of association is in most cases smaller than (and not significant relative to) the correlation of regulation of creation/destruction of firms.

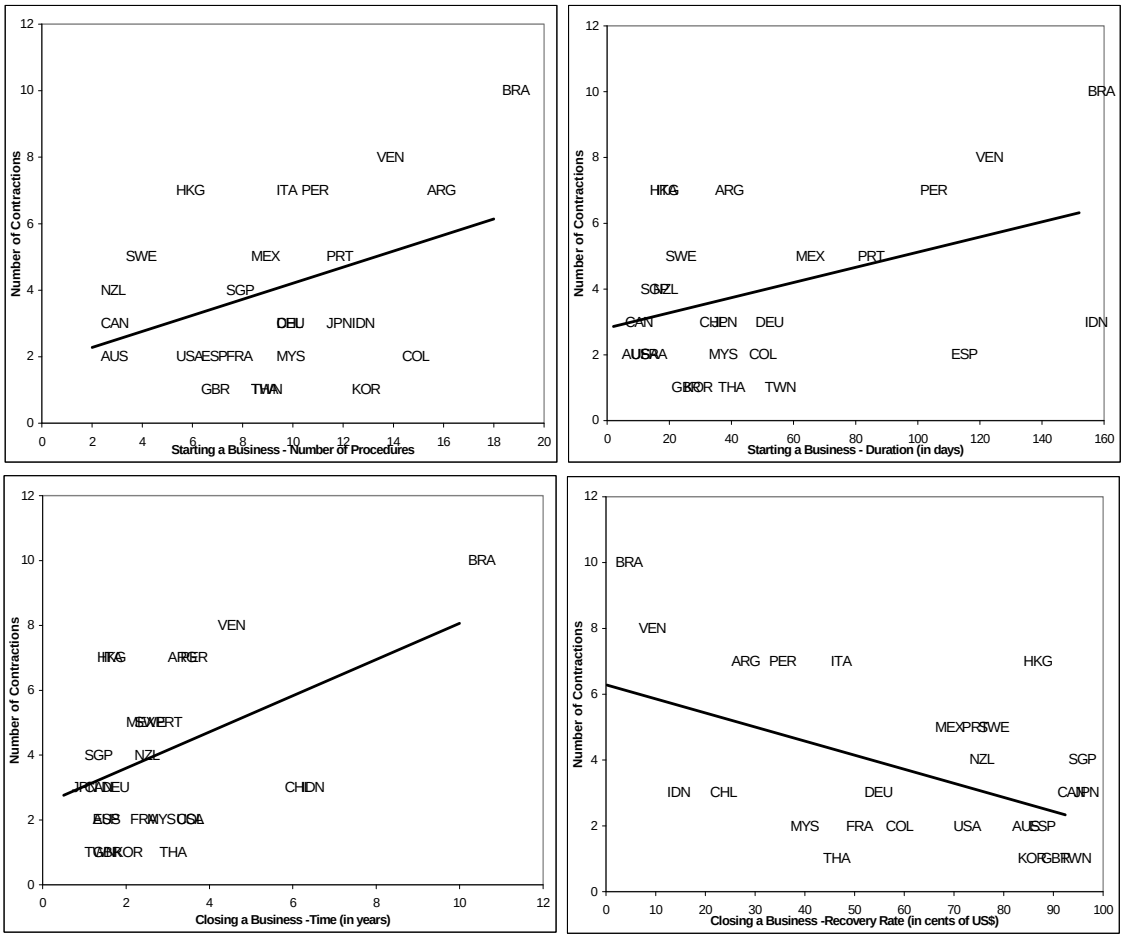
Third, getting access to credit is very important to smooth out negative shocks. The development of financial institutions is argued to lift some of the credit constraints faced by the less-favored sectors in society. In general, we find that when the population of a determined country has better access to the domestic financial system (e.g. lower cost to create collateral and better enforcement of legal rights), its business cycle usually displays a lower number of contractions and smaller costs of recessions.

Finally, the more intricate and longer are the procedures to enforce contracts (by the legal systems -- via court decisions), the larger are the number of contractions and the output loss.

[15] As measured by how many cents on the dollar claimants—creditors, tax authorities, and employees—recover from an insolvent firm.

Figure 7

Business and Labor Regulations vs. Number of Contractions



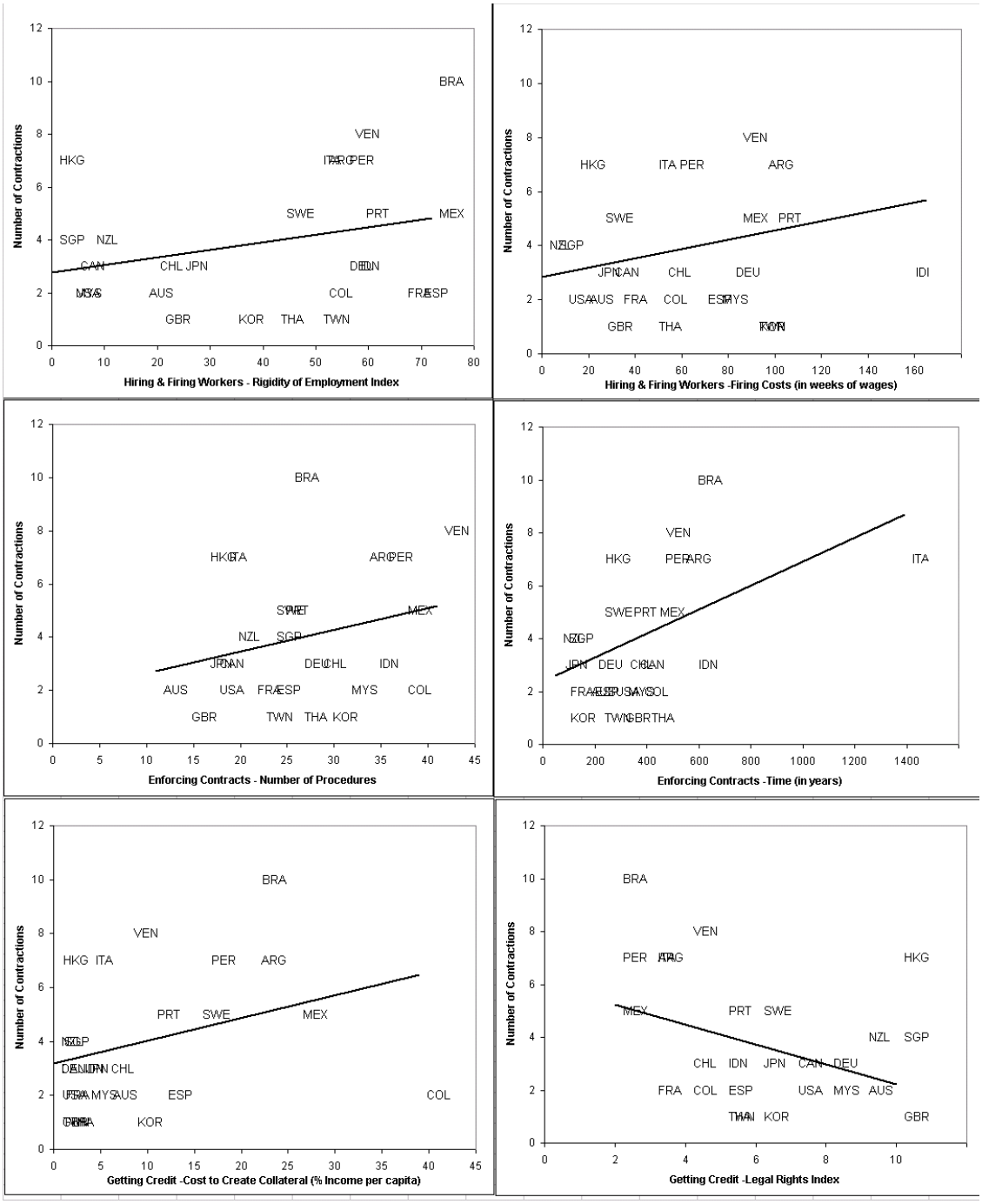
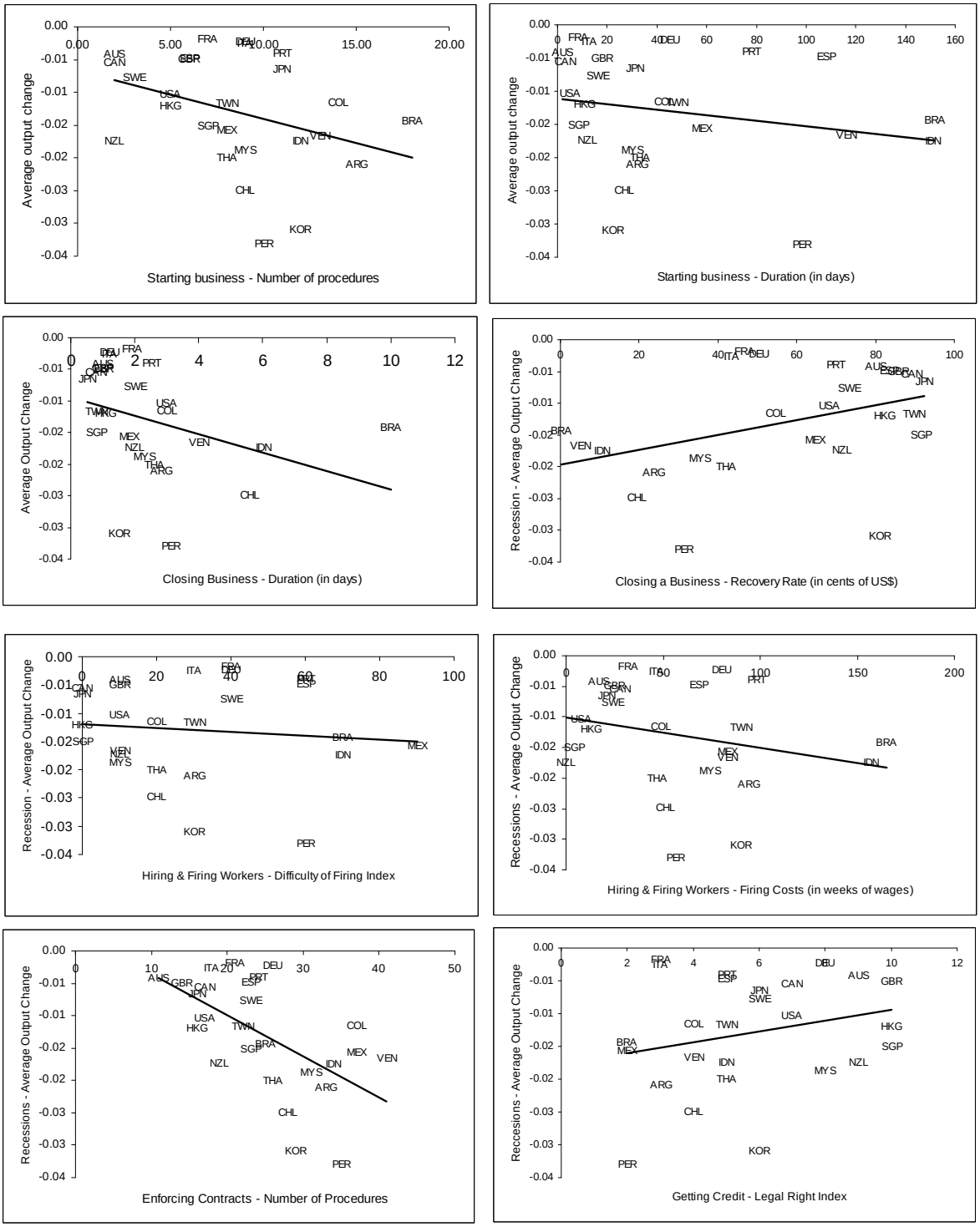

Number of Contractions
Hiring & Firing Workers - Rigidity of Employment Index
Hiring & Firing Workers -Firing Costs (in weeks of wages)
Enforcing Contracts - Number of Procedures
Enforcing Contracts -Time (in years)
Getting Credit -Cost to Create Collateral (% Income per capita)
Getting Credit -Legal Rights Index

Figure 8

Business and Labor Regulations vs. Ouput Loss per Annum in Recessions



5 Concluding remarks

This paper aims to further characterize the business cycles of emerging market economies —and, especially, Latin American countries— relative to industrial economies. More specifically, we apply the BBQ algorithm developed by Harding and Pagan (2002) on the quarterly series of real GDP over the period 1980.Q1-2006.Q2 for a sample of **35** countries, of which **23** are emerging market economies and **12** are industrial economies.

One of the main contributions of this paper is computing business cycle features for a wide array of emerging market economies using quarterly data.[16] We confirm the evidence that output fluctuations in emerging markets are more volatile than those of industrial countries. More specifically, we find that: (i) peak-to-trough phases (*i.e.* contractions) are deeper and more frequent in emerging markets, and (ii) trough-to-peak phases (i.e. expansions) are more sizable but more volatile among emerging markets than among industrial economies.

Using the information on duration and amplitude, we also computed the cumulative variation in both the peak-to-trough and trough-to-peak phases of the cycle (say, output losses and output gains, respectively). We find that the cost of recessions (i.e. cumulative variation from peak-to-trough) is typically higher in emerging markets —which approximately triples the amount of output foregone from peak-to-trough in OECD economies. On the other hand, the cumulative output variation during expansionary phases of the cycle is larger among emerging markets —especially, among East Asian economies— than among industrial ones.

We then conducted an exploratory analysis on the determinants of the cost of recessions, as measured by the average output loss per year during the peak-to-trough phase of the cycle. We identify 126 recession episodes and, due to data availability for the

[16] Typically, cross-country studies for emerging markets and developing economies use annual data (e.g. Hausmann, Rodriguez, and Wagner, 2006)

determinants of the cost of recessions, our sample was reduced to 120 recession episodes. Initial exploratory regressions (see Table 3) rendered the following results: (a) the average output loss per year from peak-to-trough was smaller among industrial countries than among East Asian and Latin American countries. (b) The largest average output loss pear year during recessions was experienced by LAC countries during the 1980s. Hence, recessions were costlier for the LAC region over time and across regions during its "*Lost Decade*."

After this initial characterization, we explore the linkages between the cost of recession and potential determinants suggested by the literature on economic fluctuations. Our regression analysis controls for external shocks (terms of trade, US interest rate shocks), macroeconomic instability and external imbalances (inflation, real exchange rate over-valuation, sudden stops), and structural features policies (financial depth, trade openness, financial openness, output diversification, and quality of institutions). We should point out that all our explanatory variables are measured in the period that precedes the recession to avoid problems of reverse causality.

We find that terms of trade shocks would subsequently affect the cost of recessions (as measured by the average annual foregone output). A deterioration in the terms of trade would raise the average annual rate of output lost during a recession in countries that are open to trade, with deeper domestic financial markets and, surprisingly, in countries a more diversified output structure. On the other hand, U.S. interest rate shocks seem to play a role in recessions taking place in East Asia. Recessions tend to be deeper (and, hence, the output loss larger) in countries experiencing a sudden stop, and the average rate of output foregone is even larger if the country has a shallow domestic financial market. Output loss in recessions is larger when the currency of the country is overvalued in real terms and when the inflation rate is higher –although the latter result is not robust. The quality of institutions seems to matter. Countries with a stronger institutional framework –say, better investment profile, government stability, higher quality of

bureaucracy, democratic accountability, among others– tend to have lower costs associated to recessionary phases.

Finally, it has been argued that frictions in the economy (say, rigidities in the labor markets and other proxies of the business environment) may play a role in explaining business cycles in emerging markets (or, more specifically, they may play a role amplifying or mitigating shocks to output growth). Given the lack of data or variability over time, we only explore the cross-section correlation between the cost of recessions and a set of indicators of economic frictions. Using scatter plots, we find that economies with higher cost of starting and closing a business are more prone to recessions and exhibit a higher output cost. The cost of recession is also higher in countries with more rigid labor markets. Lastly, recessions are more frequent and costly (in terms of average output loss) in countries with weak contract enforcement and lack of access to credit.

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APPENDIX I: Data Description

I.1 Data on Gross Domestic Product

We gather data GDP data on local currency at constant prices for a sample of selected countries. See Table I.1 for more details.

Table I.1
Sample of Countries and Sources of Data

Country	Period	Source
Argentina	1970.Q1-2005.Q1	IMF's International Financial Statistics (IFS) for 1970-79, and Ministerio de Economía y Producción (MECON) for 1980-2005. Webpage: http://www.mecon.gov.ar/secpro/dir_cn/default1.htm
Australia	1970.Q1-2005.Q1	Australian Bureau of Statistics. Data availabor from the Reserve Bank of Australia (http://www.rba.gov.au/).
Brazil	1980.Q1-2005.Q1	Central Bank of Brazil and Instituto Brasileiro de Geografía e Estatística (http://www.ibge.gov.br/)
Canada	1970.Q1-2005.Q1	IMF's International Financial Statistics (IFS)
Chile	1977.Q1-2005.Q1	Central Bank of Chile, Department of National Accounts
Colombia	1977.Q1-2004.Q4	Departamento Administrativo Nacional de Estadística (DANE, www.dane.gov.co/) for 1994-2004 and Departamento Nacional de Planeación (DNP, www.dnp.gov.co) for 1977-1993
France	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Germany	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Hong Kong	1973.Q1-2005.Q1	Census and Statistics Department de Hong Kong (http://www.info.gov.hk/censtatd/eng/hkstat/).
Indonesia	1970.Q1-2005.Q1	Statistics Indonesia, IMF's IFS
Italy	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Japan	1970.Q1-2005.Q1	Economic and Social Research Institute of Japan, IMF's IFS and Bloomberg for 2005
Korea	1970.Q1-2005.Q1	Bank of Korea
Malaysia	1988.Q1-2004.Q4	IMF's International Financial Statistics
Mexico	1980.Q1-2005.Q1	Instituto Nacional de Estadística Geografía e Informática (INEGI, http://www.inegi.gob.mx/)
New Zealand	1982.Q2-2005.Q1	Statistics New Zealand (SNZ, http://www.stats.govt.nz/)
Peru	1979.Q1-2005.Q1	Central Reserve Bank of Peru (www.bcrp.gob.pe)
Portugal	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Singapore	1975.Q1-2005.Q1	Singapore Department of Statistics (http://www.singstat.gov.sg/)
Spain	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Sweden	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Taiwan	1970.Q1-2005.Q1	National Statistics, Republic of China (http://eng.stat.gov.tw/).
Thailand	1993.Q1-2005.Q1	National Economic and Social Information Board (http://www.nesdb.go.th/).
United Kingdom	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
United States	1970.Q1-2005.Q1	Bureau of Economic Analysis (www.bea.gov)
Venezuela	1993.Q1-2005.Q1	Central Bank of Venezuela (http://www.bcv.org.ve/).

Control Variables	Period
Gross FDI Inflows	Yearly average variation (last 8 qtr before the episode)
Gross Equity related Inflows	Yearly average variation (last 8 qtr before the episode)
Terms of trade	Yearly average variation (last 8 qtr before the episode)
G3 Real Money Market Rate	Yearly average variation (last 8 qtr before the episode)
US Real Money Market Rate	Yearly average variation (last 8 qtr before the episode)
ICRG The Political Risk Rating	At the beginning of the previous year
Trade Openness	At previous year
Financial Openness (at previous year)	At previous year
Private credit by deposit money banks to GDP	At previous year
REER Sub-valuation	4 qtr before turning point (average of HP filter gap)
Inflation average	Average over previous 4 quarters

I.2 Data on Labor and Industry Regulations

We use the *Doing Business* database to measure regulations on the business environment and their enforcement (see Webpage www.doingbusiness.org). This database provides indicators on the regulatory costs of business that are comparable across 145 economies.

Starting a Business. An entrepreneur should follow several bureaucratic and legal procedures to incorporate and register a new firm. Regulation of entry into a new activity differs substantially across countries —i.e. the process can be simple and affordable in some countries whereas it could be cumbersome and lead to the payment of bribes or informality in other countries.[17] It counts all procedures (defined as a legal requirement that involves a separate interaction between the firm and an outside entity—officials, notaries, etc.) required to register a firm, and also include screening procedures by overseeing government entities, tax- and labor-related registration procedures, health and safety procedures, and environment-related procedures (see Djankov, La Porta, Lopez-de-Silanes, and Shleifer, 2002). Here, we include in our analysis the number of procedures, the average time spent during each procedure (in calendar days), the official cost of each procedure (as a percentage of income per capita), and the paid-in minimum capital (as a percentage of income per capita)

Closing a Business. Recent crisis episodes in emerging market economies have resuscitated the interest in the design of bankruptcy systems and the ability of such systems to help reorganize viable companies and close down unviable ones. Countries with inefficient bankruptcy systems would allow unviable business to survive.[18] Using a survey of bankruptcy lawyers, accountants, and judges, *Doing Business* covers the procedures on filing for bankruptcy proceedings, initiation of bankruptcy, the petition hearing, the court's decision, the appointment of an insolvency practitioner, the assessment of claims and their ordering by priority, and the sale of assets (see Djankov, Hart, Nenova, and Shleifer, 2005). A recovery rate—how many cents on the dollar claimants recover from an insolvent firm— is computed to measure the efficiency of foreclosure or bankruptcy procedures. In addition to this indicator, we also use the time of bankruptcy (in years) and its cost (as a percentage of the estate).

Hiring & Firing Workers. The regulation of labor is designed in order to protect the interests of workers and guarantee a minimum standard of living for the population. This system encompasses four bodies of law: employment, industrial relations, occupational health and safety, and social security (see Botero, Djankov, La Porta, Lopez-de-Silanes, and Shleifer, 2004). The data focuses on the regulation of employment, specifically the hiring and firing of workers. *Doing Business* measure the difficulties in hiring new workers and the rigidity of expanding or contracting the number of working hours, as well as the

[17] The Doing Business survey examines the start-up of commercial or industrial firms with up to 50 employees and start-up capital of 10 times the economy's per-capita Gross National Income (GNI).
[18] Often, the bottlenecks in bankruptcy are associated with the inefficient judicial process, and hence the unwillingness of banks and other lenders to push for a formal insolvency resolution.

difficulty and cost of dismissing redundant workers. Note that the ridigity of employment index, reported here, is the simple average of the Difficulty of Hiring index, Rigidity of Hours index, and Difficulty of Firing index. In addition, we have the indicator of firing costs.

Enforcing Contracts. When businesses engage with new customers (or borrowers), the inability to enforce contracts leads to restrictions on trade and credit to a small community of people that has developed informal relations through kinship, repeated dealings with each other, or the security of available assets. Courts enforce contracts between debtors and creditors, suppliers and customers. In many countries, courts are slow, inefficient, and even corrupt. *Doing Business* follows the step-by-step evolution of a payment dispute to measure contract enforcement. It counts the number of procedures from the moment the plaintiff files the lawsuit in court until the moment of actual payment; the associated time, in calendar days; and the associated cost, in court fees, attorney fees, and other payments to accountants, assessors, etc. Following Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2004), three indicators are used: the number of procedures, time (in calendar days), and official costs (as a percentage of the debt value).

Getting Credit. One of the greatest barriers for firms is the difficulty in obtaining credit. Well-intended protections of borrowers, such as interest rate caps or restrictions on pledging collateral, can backfire and prevent borrowers from financing their business projects. In particular, small businesses, women, and the poor face the greatest difficulties in obtaining financing. Djankov, McLiesh and Shleifer, 2004) show that broader sharing of credit information and stronger legal rights in and out of bankruptcy lead to more credit. Their database covers two sets of issues—credit information registries and the effectiveness of collateral and bankruptcy laws in facilitating lending. Credit registries are institutions/firms that gather and disseminate information on credit histories, which helps creditors assess risk and allocate credit more efficiently. Lending is also easier when borrowers are allowed to pledge their assets to lenders. But creating and registering collateral can be quite expensive and lengthy. Doing Business also investigates how well collateral and bankruptcy laws are designed to facilitate access to credit. Here, we use the five indicators developed: cost to create and register collateral (as a percentage of income per capita), index of legal rights of borrowers and lenders, index of credit information availability, coverage of public registries (number of individuals and/or firms that have a record in the registry, scaled to the adult population size), and coverage of private bureaus (number of individuals and/or firms that have a record in the bureau, scaled to the adult population size).

Protecting Investors. Preventing expropriation and exposing it when it occurs, requires legal protection of shareholders, enforcement capabilities, and disclosure of ownership and financial information. Investors benefit greatly from such legal protection. So do entrepreneurs. If expropriation remains unpunished, few would dare invest in business partnerships or publicly listed companies. The result: businesses would not reach efficient size for lack of financing, and economic growth would be held back. *Doing Business* provides a disclosure of ownership index which comprises four types of ownership

disclosure that reduce expropriation: information on family, indirect ownership, beneficial ownership, and voting agreements between shareholders. Two types of financial disclosure help investors: an audit committee that reviews and certifies financial data, and a legal requirement that an external auditor be appointed. Finally, disclosure is most effective when ownership and financial information is available to current and potential investors (see Djankov, La Porta, Lopez-de-Silanes, and Shleifer, 2005).

APPENDIX II: Comparing the Cost of Deep Crises

In the following table appears some descriptive statistics of four important crises: Chile 1982, Mexico 1995, Korea 1998, and Chile 1999. We compared the duration, amplitude, duration of the entire cycle (defined from peak until the economy reaches that initial level) and cost (foregone output respect to the initial level) among them and with the developed countries.

Table A2.1.Characterizing the Business Cycles: 1990-2004

	Duration of the Recessions (Quarters)	Duration of the Recovery (Quarters)	Duration of the Entire Cycle (Quarters)	Maximum Drop of Initial GDP (% of initial GDP)	Foregone Output (% of initial GDP)
Chile 1982-83	5.0	21.0	26.0	23.3	204.1
Chile 1998-99	3.0	6.0	9.0	4.3	13.5
Mexico (2)	4.0	4.0	8.0	6.4	23.8
Corea (1)	3.0	5.0	8.0	9.3	37.1
Latin America [1] (3,2)	4.0	5.6	9.6	6.4	46.8
Emerging 7[2] (2)	3.8	4.0	7.8	10.6	46.1
OECD Economies[3] (1,7)	3.1	3.9	7.0	1.6	6.4

[1]Include Argentina, Bolivia, Brazil, Colombia, Ecuador, Mexico, Peru, Uruguay y Venezuela.
[2]Include Korea, Hong Kong, Indonesia, Malaysia, Singapore y Taiwan.
[3]Include Australia, Canada, France, Germany, Italy, Japan, New Zealand, United Kingdom, United States.
In parenthesis is the number of recessions included in each period. The time period used is 1990 2004.

A couple of conclusions could be derived from Table A2. First, under any measure of recession intensity (duration, maximum GDP drop or foregone output) the combinations of debt crisis (1982) an internal policy hit Chile harder than the recent Asian crisis and domestic policies. Second, while Chile needed more time to recover from the Asian crisis than Korea, the cost in terms of foregone output was much lower.

The explanation for business cycles lays on two mainstreams the called real business cycles and the new Keynesian approach to business cycle. While the former emphasize technological shocks in the explanation of cycles, the second emphasize other non-technological shocks, like monetary shocks. This literature has been extended to understand the role of international economics in the transmission of cycles[19].

[19] The literature within each of these two approaches is large. For standard references see Kydland and Prescott (1982), Cooley (1995), Galí (1999).